Remarks

The Advisory Action mailed October 29, 2003 has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

The statement in the Advisory Action that the period for reply expires three months from the mailing date of the final rejection is respectfully traversed. All final rejections setting a 3-month shortened statutory period for reply should advise applicant that if a reply is filed within 2 months of the date of the final Office Action, the shortened statutory period will expire at 3 months from the date of the final rejection or on the date the advisory action is mailed, whichever is later (MPEP 706.07(f)). The final rejection was mailed on June 17, 2003. A reply to the final office action was filed on August 18, 2003, which is within 2 months from the date, June 17, 2003, of the final Office Action. August 18, 2003 is within 2 months since August 17, 2003 was a Sunday. Therefore, the shortened statutory period expired on the date, October 29, 2003, on which the Advisory Action was mailed, which is later than 3 months from the date of the final rejection.

Since the shortened statutory period expired on October 29, 2003, in accordance with 37 C.F.R. 1.136(a), a one-month extension of time is submitted herewith to extend the due date of the response to the final Office Action dated June 17, 2003 for the above-identified patent application from October 29, 2003 through and including November 29, 2003. In accordance with 37 C.F.R. 1.17(a)(1), authorization to charge a deposit account in the amount of $110.00 to cover this extension of time request is submitted herewith. However, if a two-month extension of time is required from June 17, 2003 through and including November 17, 2003, authorization to charge the deposit account in the amount of $420.00 to cover this extension of time request also is submitted herewith.

Claims 2-3, 5-11, 13-17, 19-25, and 27-35 are now pending in this application. Claims 1, 4, 12, 18, and 26 were canceled previously. Claims 15 and 31 have been amended. No new matter has been added. Claims 2-3, 5-11, 13-17, 19-25, and 27-35 stand rejected.

The objection to Claims 19-20 is respectfully traversed. Claim 33 provides proper antecedent basis for Claims 19 and 20. Accordingly, Applicants respectfully request that the objection to Claims 19 and 20 be withdrawn.

The rejection of Claims 2-3, 5-7, 15-17, 21, 27-28, 31-32, and 34 under 35 U.S.C. §101 is respectfully traversed. Claims 15 and 31 have been amended, and are submitted to be directed to statutory subject matter.

Claims 16, 17, 21-25, 27-28, 30, 34, and 35 depend, directly or indirectly, from independent Claim 15. When the recitations of Claims 16, 17, 21-25, 27-28, 30, 34, and 35 are considered in combination with the recitations of Claim 15, Applicants submit that Claims 16, 17, 21-25, 27-28, 30, 34, and 35 are directed toward statutory subject matter.

Claims 2, 3, 5-11, 13, 14, 19, 20, 29, 32, and 33 depend, directly or indirectly, from independent Claim 31. When the recitations of 2, 3, 5-11, 13, 14, 19, 20, 29, 32, and 33 are considered in combination with the recitations of Claim 31, Applicants submit that Claims 2, 3, 5-11, 13, 14, 19, 20, 29, 32, and 33 are directed toward statutory subject matter.

For the reasons set forth above, Applicants respectfully request that the Section 101 rejection of Claims 2-3, 5-7, 15-17, 21, 27-28, 31-32, and 34 be withdrawn.

The rejection of Claims 2-3, 7, 15-17, 21, and 31 under 35 U.S.C. § 103 as being unpatentable over Smith (U.S. Pat. No. 5,570,310) in view of Watson (U.S. Pat. No. 5,629,780) is respectfully traversed.

Smith describes a computation of a logarithm by a data processor (column 6, lines 20-21). In step (10), the processor reads from some memory region an instruction which causes the logarithm of an argument x to be evaluated (column 6, lines 21-23). In step (20), the processor reads from some memory region the argument x whose logarithm to some numerical base is to be computed (column 6, lines 23-25). The argument may represent a particular numeric value, infinity, or Not a Number (NaN) (column 6, lines 25-27). Whether the argument represents a particular numeric value or not, it may or may not have a logarithm

which can be represented by a real number (column 6, lines 27-30). Step (30) constructs a number y from the argument x such that if x represents a normalized numerical value, then x $= \pm 2^k y$ with $1 \leq y < 2$ (column 6, lines 30-32). If x does not represent a numeric value, y still represents a numeric value which can be used in arithmetic operations without causing any exceptions, which can enhance speed and performance by not having to check initially for special conditions (column 6, lines 32-37). The early generation of a valid y provides a very fast route for computing the logarithm in almost all cases normally encountered (column 6, lines 37-38). The additional processing required for a denormalized numeric argument is illustrated in FIG. 2 (column 6, lines 38-40). Step (40) uses the bit representation of the argument x or of the number y as a basis for reading from memory a predetermined quantity a (column 6, lines 41-44). An efficient way of determining which predetermined quantity a is to be read is described in FIG. 3 (column 6, lines 44-46). Step (50) determines whether the logarithm of the argument x exists or not (column 6, lines 47-48). If it does, it returns a close approximation to the logarithm obtained by evaluating log(y)=-log(a)+log(1+(ay-1)) and log(x)=klog(2)+log(y) in step 60 (column 6, lines 48-50). The details of one way in which this can be performed will be described by FIG. 3 (column 6, lines 50-52). If the logarithm of the argument does not exist, a return path which provides further information is performed in step (70) (column 6, lines 52-54). An efficient way of returning this further information in one environment is described in further detail in FIG. 4 (column 6, lines 54-56).

Watson describes a method for performing color or grayscale image compression using a Discrete Cosine Transform (DCT) (Abstract). In the method, a storage mode (16) is segmented into the following steps: color transform (31), down-sample (32), block (33), DCT (34), initial matrices (35), quantization matrix optimizer (36), quantize (38), and entropy code (40) (column 5, line 67 – column 6, line 4). After the calculation of a DCT mask (70) has been determined, an iterative process of estimating the quantization matrix operator (36) begins and includes processing segments (56, 58, 60, 62, 64, and 66) (column 9, lines 8-11). The quantization matrix optimizer transforms each block of the image in an initial matrix (35) into segments (56). A bisection method is then used to increment or decrement the initial matrices. In the bisection method, a range is established for $q_{u,v,\theta}$ between lower and upper

bounds, typically 1 to 255 (column 10, lines 28-30). A perceptual error matrix $p_{u,v,\theta}$ is evaluated at midpoint of the range (column 10, lines 30-32). If $p_{u,v,\theta}$ is greater than a target error parameter, then the lower bound is reset to the mid-point (column 10, lines 32-34).

Claim 15 recites a computing device comprising a memory in which binary floating point representations of particular numbers are stored, the device being configured to "partition a mantissa region between 1 and 2 into N equally spaced sub-regions; precompute centerpoints a_i of each of the N equally spaced sub-regions, where $i=0,...,N-1$, wherein N is sufficiently large so that, within each sub-region, a first degree polynomial in m computes $\log(m)$ to within a preselected degree of accuracy for any m within the sub-region, where m is a mantissa of a binary floating point representation of a number; compute a value of $\log(x)$ for a binary floating point representation of a particular number x stored in said memory utilizing the first degree polynomial in m, wherein $\log(x)$ is a function of a distance between a_i and the mantissa; and generate an image by using the computed value of $\log(x)$".

Neither Smith nor Watson, considered alone or in combination, describe or suggest a computing device comprising a memory in which binary floating point representations of particular numbers are stored, the device being configured to partition a mantissa region between 1 and 2 into N equally spaced sub-regions, precompute centerpoints a_i of each of the N equally spaced sub-regions, where $i=0,...,N-1$, wherein N is sufficiently large so that, within each sub-region, a first degree polynomial in m computes $\log(m)$ to within a preselected degree of accuracy for any m within the sub-region, where m is a mantissa of a binary floating point representation of a number, compute a value of $\log(x)$ for a binary floating point representation of a particular number x stored in said memory utilizing the first degree polynomial in m, wherein $\log(x)$ is a function of a distance between a_i and the mantissa, and generate an image by using the computed value of $\log(x)$.

Moreover, neither Smith nor Watson, considered alone or in combination, describe or suggest a computing device configured to compute a value of $\log(x)$ for a binary floating point representation of a particular number x stored in said memory utilizing the first degree

polynomial in m, wherein $\log(x)$ is a function of a distance between a_i and the mantissa. Rather, Smith describes that a close approximation to the logarithm is obtained by evaluating log(y)=-log(a)+log(1+(ay-1)) and that log(x)=klog(2)+log(y), and Watson describes that a bisection method is used to increment or decrement a matrix, wherein the bisection method includes establishing a range for $q_{u,v,\theta}$ between lower and upper bounds, typically 1 to 255, a perceptual error matrix $p_{u,v,\theta}$ is then evaluated at midpoint of the range. For the reasons set forth above, Claim 1 is submitted to be patentable over Smith in view of Watson.

Claims 16, 17, and 21 depend, directly or indirectly, from independent Claim 15. When the recitations of Claims 16, 17, and 21 are considered in combination with the recitations of Claim 15, Applicants submit that dependent Claims 16, 17, and 21 likewise are patentable over Smith in view of Watson.

Claim 31 recites a method for computing an approximation of a natural logarithm function including the steps of "partitioning a mantissa region between 1 and 2 into N equally spaced sub-regions; precomputing centerpoints a_i of each of the N equally spaced sub-regions, where $i = 0,\ldots,N-1$; selecting N sufficiently large so that, for each sub-region, a first degree polynomial in m computes $\log(m)$ to within a preselected degree of accuracy for any m within the sub-region, where m is a binary mantissa of a binary floating point representation of a number; computing a value of $\log(x)$ for a binary floating point representation of a particular number x stored in a memory of a computing device utilizing the first degree polynomial in m, wherein $\log(x)$ is a function of a distance between a_i and the mantissa; and generating an image by using the computed value of $\log(x)$".

Neither Smith nor Watson, considered alone or in combination, describe or suggest a method for computing an approximation of a natural logarithm function including the steps of partitioning a mantissa region between 1 and 2 into N equally spaced sub-regions, precomputing centerpoints a_i of each of the N equally spaced sub-regions, where $i = 0,\ldots,N-1$, selecting N sufficiently large so that, for each sub-region, a first degree

polynomial in m computes $\log(m)$ to within a preselected degree of accuracy for any m within the sub-region, where m is a binary mantissa of a binary floating point representation of a number; computing a value of $\log(x)$ for a binary floating point representation of a particular number x stored in a memory of a computing device utilizing the first degree polynomial in m, wherein $\log(x)$ is a function of a distance between a_i and the mantissa; and generating an image by using the computed value of $\log(x)$.

Moreover, neither Smith nor Watson, considered alone or in combination, describe or suggest a method including computing a value of $\log(x)$ for a binary floating point representation of a particular number x stored in a memory of a computing device utilizing the first degree polynomial in m, wherein $\log(x)$ is a function of a distance between a_i and the mantissa. Rather, Smith describes that a close approximation to the logarithm is obtained by evaluating log(y)=-log(a)+log(1+(ay-1)) and that log(x)=klog(2)+log(y), and Watson describes that a bisection method is used to increment or decrement a matrix, wherein the bisection method includes establishing a range for $q_{u,v,\theta}$ between lower and upper bounds, typically 1 to 255, a perceptual error matrix $p_{u,v,\theta}$ is then evaluated at midpoint of the range. For the reasons set forth above, Claim 31 is submitted to be patentable over Smith in view of Watson.

Claims 2, 3, and 7 depend, directly or indirectly, from independent Claim 31. When the recitations of Claims 2, 3, and 7 are considered in combination with the recitations of Claim 31, Applicants submit that dependent Claims 2, 3, and 7 likewise are patentable over Smith in view of Watson.

Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. Obviousness cannot be established by merely suggesting that it would have been obvious to one of ordinary skill in the art to modify Smith according to the teachings of the Watson. More specifically, as is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. Rather, the

present Section 103 rejection appears to be based on a combination of teachings selected from several patents in an attempt to arrive at the claimed invention. Specifically, Smith is cited for its teaching that a close approximation to the logarithm is obtained by evaluating log(y)=-log(a)+log(1+(ay-1)) and that log(x)=klog(2)+log(y), and Watson is cited for its teaching that a bisection method is used to increment or decrement a matrix, wherein the bisection method includes establishing a range for $q_{u,v,\theta}$ between lower and upper bounds, typically 1 to 255, a perceptual error matrix $p_{u,v,\theta}$ is then evaluated at midpoint of the range. Since there is no teaching or suggestion in the cited art for the claimed combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants respectfully request that the Section 103 rejection be withdrawn.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion nor motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

For the reasons set forth above, Applicants respectfully request that the Section 103 rejections of Claims 2-3, 7, 15-17, 21, and 31 be withdrawn.

The rejection of Claims 8-9, 22-23, and 29-30 under 35 U.S.C. § 103 as being unpatentable over Smith in view of Wallschlaeger (U.S. Pat. No. 5,345,381) is respectfully traversed.

Smith is described above. Wallschlaeger describes a spiral scan computer tomography apparatus with improved image quality in comparison to conventional systems

(column 1, lines 50-53). For systems using a spiral scan, interpolation algorithms have been developed which generate new data, by interpolation, corresponding to a planar slice from the spiral data before the actual image reconstruction (column 1, lines 29-33). Interpolation algorithms are then used on the spiral data in the form of attenuation values (column 1, lines 36-38). The attenuation values are scaled line integrals or scaled logarithms of the relative intensities (column 1, lines 38-39).

Claims 22, 23, and 30 depend, directly or indirectly, from independent Claim 15 which recites a computing device comprising a memory in which binary floating point representations of particular numbers are stored, the device being configured to "partition a mantissa region between 1 and 2 into N equally spaced sub-regions; precompute centerpoints a_i of each of the N equally spaced sub-regions, where $i=0,\ldots,N-1$, wherein N is sufficiently large so that, within each sub-region, a first degree polynomial in m computes log(m) to within a preselected degree of accuracy for any m within the sub-region, where m is a mantissa of a binary floating point representation of a number; compute a value of log(x) for a binary floating point representation of a particular number x stored in said memory utilizing the first degree polynomial in m, wherein log(x) is a function of a distance between a_i and the mantissa; and generate an image by using the computed value of log(x)".

Neither Smith nor Wallschlaeger, considered alone or in combination, describe or suggest a computing device comprising a memory in which binary floating point representations of particular numbers are stored, the device being configured to partition a mantissa region between 1 and 2 into N equally spaced sub-regions, precompute centerpoints a_i of each of the N equally spaced sub-regions, where $i=0,\ldots,N-1$, wherein N is sufficiently large so that, within each sub-region, a first degree polynomial in m computes log(m) to within a preselected degree of accuracy for any m within the sub-region, where m is a mantissa of a binary floating point representation of a number, compute a value of log(x) for a binary floating point representation of a particular number x stored in said memory utilizing the first degree polynomial in m, wherein log(x) is a function of a distance between a_i and the mantissa, and generate an image by using the computed value of log(x).

Moreover, neither Smith nor Wallschlaeger, considered alone or in combination, describe or suggest a computing device configured to compute a value of log(x) for a binary floating point representation of a particular number x stored in said memory utilizing the first degree polynomial in m, wherein log(x) is a function of a distance between a_i and the mantissa. Rather, Smith describes that a close approximation to the logarithm is obtained by evaluating log(y)=-log(a)+log(1+(ay-1)) and that log(x)=klog(2)+log(y), and Wallschlaeger describes a spiral scan computer tomography apparatus with improved image quality in comparison to conventional systems. For the reasons set forth above, Claim 15 is submitted to be patentable over Smith in view of Wallschlaeger.

Claims 22, 23, and 30 depend, directly or indirectly, from independent Claim 15. When the recitations of Claims 22, 23, and 30 are considered in combination with the recitations of Claim 15, Applicants submit that dependent Claims 22, 23, and 30 likewise are patentable over Smith in view of Wallschlaeger.

Claims 8, 9, and 29 depend, directly or indirectly, from independent Claim 31 which recites a method for computing an approximation of a natural logarithm function including the steps of "partitioning a mantissa region between 1 and 2 into N equally spaced sub-regions; precomputing centerpoints a_i of each of the N equally spaced sub-regions, where $i = 0,\ldots,N-1$; selecting N sufficiently large so that, for each sub-region, a first degree polynomial in m computes $\log(m)$ to within a preselected degree of accuracy for any m within the sub-region, where m is a binary mantissa of a binary floating point representation of a number; computing a value of $\log(x)$ for a binary floating point representation of a particular number x stored in a memory of a computing device utilizing the first degree polynomial in m, wherein log(x) is a function of a distance between a_i and the mantissa; and generating an image by using the computed value of log(x)".

Neither Smith nor Wallschlaeger, considered alone or in combination, describe or suggest a method for computing an approximation of a natural logarithm function including the steps of partitioning a mantissa region between 1 and 2 into N equally spaced sub-

regions, precomputing centerpoints a_i of each of the N equally spaced sub-regions, where $i = 0,\ldots,N-1$, selecting N sufficiently large so that, for each sub-region, a first degree polynomial in m computes $\log(m)$ to within a preselected degree of accuracy for any m within the sub-region, where m is a binary mantissa of a binary floating point representation of a number; computing a value of $\log(x)$ for a binary floating point representation of a particular number x stored in a memory of a computing device utilizing the first degree polynomial in m, wherein $\log(x)$ is a function of a distance between a_i and the mantissa; and generating an image by using the computed value of $\log(x)$.

Moreover, neither Smith nor Wallschlaeger, considered alone or in combination, describe or suggest a method including computing a value of $\log(x)$ for a binary floating point representation of a particular number x stored in a memory of a computing device utilizing the first degree polynomial in m, wherein $\log(x)$ is a function of a distance between a_i and the mantissa. Rather, Smith describes that a close approximation to the logarithm is obtained by evaluating log(y)=-log(a)+log(1+(ay-1)) and that log(x)=klog(2)+log(y), and Wallschlaeger describes a spiral scan computer tomography apparatus with improved image quality in comparison to conventional systems. For the reasons set forth above, Claim 31 is submitted to be patentable over Smith in view of Wallschlaeger.

Claims 8, 9, and 29 depend, directly or indirectly, from independent Claim 31. When the recitations of Claims 8, 9, and 29 are considered in combination with the recitations of Claim 31, Applicants submit that dependent Claims 8, 9, and 29 likewise are patentable over Smith in view of Wallschlaeger.

Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. Obviousness cannot be established by merely suggesting that it would have been obvious to one of ordinary skill in the art to modify Smith according to the teachings of the Wallschlaeger. More specifically, as is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination.

Rather, the present Section 103 rejection appears to be based on a combination of teachings selected from several patents in an attempt to arrive at the claimed invention. Specifically, Smith is cited for its teaching that a close approximation to the logarithm is obtained by evaluating log(y)=-log(a)+log(1+(ay-1)) and that log(x)=klog(2)+log(y), and Wallschlaeger is cited for its teaching that a spiral scan computer tomography apparatus with improved image quality in comparison to conventional systems. Since there is no teaching or suggestion in the cited art for the claimed combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants respectfully request that the Section 103 rejection be withdrawn.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion nor motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

For the reasons set forth above, Applicants respectfully request that the Section 103 rejections of Claims 8-9, 22-23, and 29-30 be withdrawn.

The rejection of Claims 10-11 and 24-25 under 35 U.S.C. § 103 as being unpatentable over Smith in view of Wallschlaeger and further in view of Watson is respectfully traversed.

Smith, Wallschlaeger, and Watson are described above.

Claims 10 and 11 depend indirectly from independent Claim 31 which recites a method for computing an approximation of a natural logarithm function including the steps of

"partitioning a mantissa region between 1 and 2 into N equally spaced sub-regions; precomputing centerpoints a_i of each of the N equally spaced sub-regions, where $i = 0,\ldots,N-1$; selecting N sufficiently large so that, for each sub-region, a first degree polynomial in m computes $\log(m)$ to within a preselected degree of accuracy for any m within the sub-region, where m is a binary mantissa of a binary floating point representation of a number; computing a value of $\log(x)$ for a binary floating point representation of a particular number x stored in a memory of a computing device utilizing the first degree polynomial in m, wherein $\log(x)$ is a function of a distance between a_i and the mantissa; and generating an image by using the computed value of $\log(x)$".

None of Smith, Wallschlaeger, and Watson, considered alone or in combination, describe or suggest a method for computing an approximation of a natural logarithm function including the steps of partitioning a mantissa region between 1 and 2 into N equally spaced sub-regions, precomputing centerpoints a_i of each of the N equally spaced sub-regions, where $i = 0,\ldots,N-1$, selecting N sufficiently large so that, for each sub-region, a first degree polynomial in m computes $\log(m)$ to within a preselected degree of accuracy for any m within the sub-region, where m is a binary mantissa of a binary floating point representation of a number; computing a value of $\log(x)$ for a binary floating point representation of a particular number x stored in a memory of a computing device utilizing the first degree polynomial in m, wherein $\log(x)$ is a function of a distance between a_i and the mantissa; and generating an image by using the computed value of $\log(x)$.

Moreover, none of Smith, Wallschlaeger, and Watson, considered alone or in combination, describe or suggest a method including computing a value of $\log(x)$ for a binary floating point representation of a particular number x stored in a memory of a computing device utilizing the first degree polynomial in m, wherein $\log(x)$ is a function of a distance between a_i and the mantissa. Rather, Smith describes a close approximation to the logarithm is obtained by evaluating log(y)=-log(a)+log(1+(ay-1)) and that

log(x)=klog(2)+log(y), Wallschlaeger describes a spiral scan computer tomography apparatus with improved image quality in comparison to conventional systems, and Watson describes that a bisection method is used to increment or decrement a matrix, wherein the bisection method includes establishing a range for $q_{u,v,\theta}$ between lower and upper bounds, typically 1 to 255, a perceptual error matrix $p_{u,v,\theta}$ is then evaluated at midpoint of the range. For the reasons set forth above, Claim 31 is submitted to be patentable over Smith in view of Wallschlaeger and further in view of Watson.

Claims 10-11 depend, directly or indirectly, from independent Claim 31. When the recitations of Claims 10-11 are considered in combination with the recitations of Claim 31, Applicants submit that dependent Claims 10-11 likewise are patentable over Smith in view of Wallschlaeger and further in view of Watson.

Claims 24-25 depend, directly or indirectly, from independent Claim 15 which recites a computing device comprising a memory in which binary floating point representations of particular numbers are stored, the device being configured to "partition a mantissa region between 1 and 2 into N equally spaced sub-regions; precompute centerpoints a_i of each of the N equally spaced sub-regions, where $i=0,\ldots,N-1$, wherein N is sufficiently large so that, within each sub-region, a first degree polynomial in m computes log(m) to within a preselected degree of accuracy for any m within the sub-region, where m is a mantissa of a binary floating point representation of a number; compute a value of log(x) for a binary floating point representation of a particular number x stored in said memory utilizing the first degree polynomial in m, wherein log(x) is a function of a distance between a_i and the mantissa; and generate an image by using the computed value of log(x)".

None of Smith, Wallschlaeger, and Watson, considered alone or in combination, describe or suggest a computing device comprising a memory in which binary floating point representations of particular numbers are stored, the device being configured to partition a mantissa region between 1 and 2 into N equally spaced sub-regions, precompute centerpoints a_i of each of the N equally spaced sub-regions, where $i=0,\ldots,N-1$, wherein N is sufficiently

large so that, within each sub-region, a first degree polynomial in *m* computes log(*m*) to within a preselected degree of accuracy for any *m* within the sub-region, where *m* is a mantissa of a binary floating point representation of a number, compute a value of log(*x*) for a binary floating point representation of a particular number *x* stored in said memory utilizing the first degree polynomial in *m*, wherein log(*x*) is a function of a distance between a_i and the mantissa, and generate an image by using the computed value of log(*x*).

Moreover, none of Smith, Wallschlaeger, and Watson considered alone or in combination, describe or suggest a computing device configured to compute a value of log(*x*) for a binary floating point representation of a particular number *x* stored in said memory utilizing the first degree polynomial in *m*, wherein log(*x*) is a function of a distance between a_i and the mantissa. Rather, Smith describes a close approximation to the logarithm is obtained by evaluating log(y)=-log(a)+log(1+(ay-1)) and that log(x)=klog(2)+log(y), Wallschlaeger describes a spiral scan computer tomography apparatus with improved image quality in comparison to conventional systems, and Watson describes that a bisection method is used to increment or decrement a matrix, wherein the bisection method includes establishing a range for $q_{u,v,\theta}$ between lower and upper bounds, typically 1 to 255, a perceptual error matrix $p_{u,v,\theta}$ is then evaluated at midpoint of the range. For the reasons set forth above, Claim 15 is submitted to be patentable over Smith in view of Wallschlaeger and further in view of Watson.

Claims 24-25 depend, directly or indirectly, from independent Claim 15. When the recitations of Claims 24-25 are considered in combination with the recitations of Claim 15, Applicants submit that dependent Claims 24-25 likewise are patentable over Smith in view of Wallschlaeger and further in view of Watson.

Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. Obviousness cannot be established by merely suggesting that it would have been obvious to one of ordinary skill in the art to modify Smith according to the teachings of the Wallschlaeger and Watson. More specifically, as is well established,

obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. Rather, the present Section 103 rejection appears to be based on a combination of teachings selected from several patents in an attempt to arrive at the claimed invention. Specifically, Smith is cited for its teaching that a close approximation to the logarithm is obtained by evaluating log(y)=–log(a)+log(1+(ay-1)) and that log(x)=klog(2)+log(y), Wallschlaeger is cited for its teaching of a spiral scan computer tomography apparatus with improved image quality in comparison to conventional systems, and Watson is cited for its teaching that a bisection method is used to increment or decrement a matrix, wherein the bisection method includes establishing a range for $q_{u,v,\theta}$ between lower and upper bounds, typically 1 to 255, a perceptual error matrix $p_{u,v,\theta}$ is then evaluated at midpoint of the range. Since there is no teaching or suggestion in the cited art for the claimed combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants respectfully request that the Section 103 rejection be withdrawn.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

For the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 10-11 and 24-25 be withdrawn.

Claims 13-14, 19-20, 33, and 35 are indicated as being allowable if amended to incorporate the recitations of the respective base claims and any respective intervening claims. Claim 35 depend, directly or indirectly, from independent Claim 15 which is submitted to be in condition for allowance. When the recitations of Claim 35 are considered in combination with the recitations of Claim 15, Applicants submit that dependent Claim 35 is also in condition for allowance.

Claims 13, 14, 19, 20, and 33 depend, directly or indirectly, from independent Claim 31 which is submitted to be in condition for allowance. When the recitations of Claims 13, 14, 19, 20, and 33 are considered in combination with the recitations of Claim 31, Applicants submit that dependent Claims 13, 14, 19, 20, and 33 are also in condition for allowance.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,

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